7 APPENDICES

7-1. GENERAL SPECIFICATION

NO.	ITEM	DESCRIPTION
1	AD Conversion	50,000 Count Resolution, 0.05% Basic Accuracy and 50ms of Sampling Time
2	Pre-requisition for Normal Use	<1 Year Calibration Cycle 23+5℃ of Ambient Temperature <90%RH of Humidity & Non-condensing
3	Accuracy Expr.	±(% of Reading + Least Significant Digits)
4	Bar-graph	Binary 17 Bit Expression of Main Digit Decimal
5	Polarity Indication	- For Negative, None for Positive
6	LCD Update Rate	0.5 second typ. Except for the Below Functions 1~10 second for Hz, PW, capacitance
7	Memory Locations	10 Memories for 10 Measured Data
8	Power Source	9V Battery, Carbon Zinc or Alkaline Neda1604, 6F22, 006P
9	Auto Power Off	15 min. Typ. After Last Operation of Key or Switch
10	Auto Back Light Off	Automatically Turns off Typically 30 sec. after the Back Light Turned on by Pressing the Light Key.
11	Power Consumption & Battery Life	1) Normal Operating : 7mA typ. which is Equivalent to 36 Hours of Continuous Use with General Zinc-carbon Type 9V Battery 2) Auto Power Off : 70uA typ. (Equiv. to 5 Month) 3) Power Switch Off : 7uA Max. (Equiv. to 4 Year)
12	Safety	CE Requirement
13	Temp. Coefficient	<0.1 x Accuracy Spec. / ℃ for 0~18℃ and 28~40℃ (32~64.4°F and 82.4~104°F)

NO.	ITEM	DESCRIPTION
14	Operating Temp.	0~40°C(32~104°F)
15	Relative Humidity	<90% RH at 0~28°C(32~82.4°F), Non Condensing <80% RH at 28~40°C(82.4~104°F), Non Condensing
16	Storage Temp.	-20 ~ 60°C at <70% RH & Non Condense
17	Basic Accessory	Test Leads, User Manual, Gift Box, Holster RS232C CD for WIN95 & WIN3.1 RS232C Adaptor Cable
18	Option Accessory	Temp. Adaptor (608TA) Temp. Probe (K)
19	Low Battery Detect	Battery Indicator on LCD Appears at Below 6±1V.
20	Physical Size (HxWxD)	Main Unit(Net): 203.5x94.0x43.2mm With Holster: 216.5x104.5x58.0mm
21	Physical Weight	Main Unit(Net): 417g(14.7 oz) With Holster: 557g(1 lb 3.6 oz)

Note

ENVIRONMENTAL CONDITIONS

This applies to equipment designed to be safe at least under the following conditions:

- **indoor use;**
- **altitude up to 2,000m or above 2,000m if specified by the manufacturer;**
- **temperature 5°C to 40°C ;**
- **maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C;**

- **transient overvoltages according to INSTALLATION CAT II.**
- **POLLUTION DEGREE 2.**

7-2. ELECTRICAL SPECIFICATION

1. DC mV & V

FUNCTION	RANGE	ACCURACY	INPUT IMPEDANCE	PROTECTION
DC mV	500.00mV	0.05% +5d	>1Gohm	MAX. 250VAC or DC (5kohm PTC)
	2500.0mV			
DCV	5.0000V		About 10.5 Mohm	MAX. 1000VDC or 750VAC (10Mohm)
	50.000V		About 10 Mohm	
	500.00V		About 10 Mohm	
	1000.0V		About 10 Mohm	

2. AC mV & V

FUNCTION	RANGE	ACCURACY FOR EACH FREQUENCY BAND				
		50—500Hz	UP TO 1kHz	UP TO 5kHz	UP TO 10kHz	UP TO 20kHz
AC mV	500.00mV	0.75% +20d	for <400mV	1.5%	2%	3%
		1%	for >400mV	for >50mV	for >50mV	for >50mV
AC V	5.0000 V	0.75% +20d	1% for ACV Level more than 10% of Full Scale Reading		2% for ACV >10% of Full Scale	Not Specified
	50.000 V					
	500.00 V					
	750.0 V					

Note

1) Input impedance for ACmV : >1Gohm shunted with 100pF typ.
For ACV : About 10Mohm shunted with 30pF typ.

2) Applicable crest factor : Max. 3 for full scale
Additional error and crest factor for various waveforms

WAVE FORM	CREST FACTOR	ADDITIONAL ERROR
SQUARE	1	0.20%
SINE	1.414	0%
TRIANGLE	1.73	0.30%
OTHERS	2	0.50%
	3	1.70%

3) Protection for ACmV : Max 250VAC or DC with 5kohm PTC
For ACV : Max 1000VDC or 750VAC with 10Mohm

3. AC+DC mV & V

FUNCTION	RANGE	ACCURACY FOR EACH FREQUENCY BAND				
		50~500Hz	UP TO 1kHz	UP TO 5kHz	UP TO 10kHz	UP TO 20kHz
AC+DC mV	500.00mV	1.5%+50d for <300mV 2.0% for >300mV		2.5% for >50mV	3.5% for >50mV	4.5% for >50mV
AC+DC V	5.0000 V	2.0%+50d	2.5% for AC+DC V Level more than 10% of Full Scale Reading		3.5% for AC+DC V >10% of Full Scale	Not Specified
	50.000 V					
	500.00 V					
	750.0 V					

Note

Input impedance, crest factors and protections are the same as those descrived in the above item for AC mV & AC V.

4. DC current

FUNCTION	SHUNT	RANGE	ACCURACY	PROTECTION
DC uA	100 ohm	5000.0 uA	0.2%+5d	1A/600V Fast Fuse & 22V M.O.Varistor
DC mA	1 ohm	500.00 mA		
DC A	10Mohm	10.000 A	0.5%+5d	15A/600V Fast Fuse

Note

1) Burden voltage : Test current x (Shunt R + Fuse R)

2) The "A" input terminal allows current flow continuous up to 5A within 3 minutes up to 10A or within 30 seconds up to 15A. Successive high current measurements above 5A require 10minutes of cooling time between measurements.

5. AC current

FUNCTION	RANGE	FREQUENCY	ACCURACY	PROTECTION
AC uA	5000.0 uA	50Hz to 1kHz	0.75%+20d for<40000count 1% for>40000count	1A/600V Fast Fuse & 22V M.O.Varistor
AC mA	500.00 mA			
AC A	10.000 A			15A/600V Fast Fuse

Note

1) Burden voltage : Same as in DC current

2) True RMS crest factor : Same as in AC V

3) Frequency response up to 20kHz is the same as those for ACmV.

6. AC+DC current

FUNCTION	RANGE	FREQUENCY	ACCURACY	PROTECTION
AC+DC uA	5000.0 uA	DC to 1kHz	1.5% +50d for<30000count 2% for>30000count	1A/600V Fast Fuse & 22V M.O Varister
AC+DC mA	500.00 mA			
AC A	10.000 A			15A/600V Fast Fuse

Note

1) Burden voltage : Same as in DC current
2) True RMS crest factor : Same as in AC V
3) Frequency response up to 20kHz is the same as those for AC+DCmV.

7. Resistance

RANGE	RESOL.	ACCURACY	OPEN/SHORT	PROTECTION
50.00 ohm	0.01 ohm	1.0% +20d	2.5V / 1.7mA	250VAC or DC (500 ohm PTC)
5.0000 k	0.1 ohm	0.2% +5d	2.5V / 1.7mA	
50.000 k	1 ohm		2.5V / 240uA	
500.00 k	10 ohm		2.5V / 25uA	
5.0000 M	100 ohm		2.5V / 2.5uA	
50.000 M	1k ohm	1.0% +10d	2.5V / 250nA	

Note

When testing high resistance in Mohm range, very perfect Shielding and extremely short test leads is recommended for accurate measurement and for avoiding disturbance due to external noise.

8. LV ohm (Low Voltage OHM)

RANGE	RESOL.	ACCURACY	OPEN/SHORT	PROTECTION
5.000 k	1 ohm	0.2% +5d	0.25V / 170uA	250VAC or DC (500 ohm PTC)
50.00 k	10 ohm		0.25V / 24uA	
500.0 k	100 ohm		0.25V / 2.5uA	
5.000 M	1k ohm		0.25V / 250uA	
50.00 M	10k ohm	1.0% +10d	0.25V / 25nA	

Note

This LV ohm is very useful function in your checking very complicate PCB

assembly, because its testing voltage is very low enough to regard semiconductors as open circuit and therefore you can check exact resistance value of each component without taking off its surrounding semiconductors or breaking PCB patterns connected with them.

9. nS

RANGE	RESOL.	ACCURACY	OPEN/SHORT	PROTECTION
500.0 nS	0.1 nS	3.0% +5d	2.5V / 25 nA	250VAC or DC

Note

1) S = 1/R
Where S : Siemens, R : Resistance
500nS corresponds to 2Mohm, 0.1nS to 10Gohm.
2) Careful attention for shielding from noise in very high

10. CONTINUITY

RANGE	INPUT	RESPONSE	ACCURACY	PROTECTION
5 kohm	Short	Buzz On	<5 ohm	250VAC or DC (500 ohm PTC)
	Open	Buzz Off	>15 ohm	
50 kohm	Short	Buzz On	<50 ohm	
	Open	Buzz Off	>100 ohm	
500 kohm	Short	Buzz On	<500 ohm	
	Open	Buzz Off	>1 kohm	
5 Mohm	Short	Buzz On	<5 kohm	
	Open	Buzz Off	>10 kohm	

11. ZENER DIODE

RANGE	ACCURACY	TEST CURRENT	OPEN CIRCUIT V	PROTECTION
15.000 V	5% +10d	1mA	15 to 22V	250VAC or DC (500 ohm PTC)

Note

1) Zener diode voltage from 0V up to open circuit voltage (15~22V) can be conveniently measured with 1mA constant current source circuit built in this meter.
2) This function can be used as constant current source with high accuracy of 1mA±5% for compliance voltage of about 20V.

12. Capacitance

RANGE	RESOL.	ACCURACY	TESTING TIME	PROTECTION
5.000 nF	1 pF	5% +10d	1.1 Sec.	250VAC or DC (500 ohm PTC)
50.00 nF	10 pF	2% +10d		
500.0 nF	100 pF			
5.000 uF	1 nF	2% +5d		
50.00 uF	10 nF			
500.0 uF	100 nF	3% +10d	VARIABLE (1.1~10 Sec)	
5.000 mF	1 uF			

Note

When testing high resistance in Mohm range, very perfect shielding and extremely short test leads will make accurate measurement and make free from disturbance by external noise.

13. Frequency

RANGE	RESOL.	ACCURACY	INPUT IMPEDANCE	PROTECTION
50.00 Hz	0.01 Hz	0.01% +5d	10Mohm // 1nF	500VAC or DC (1kV 1nF Capacitor Parallel with 10M 1/2W Resistor)
500.0 Hz	0.1 Hz			
50.000 kHz	1 Hz			
500.00 kHz	10 Hz			
5.0000 kHz	100 Hz			

Note

1) Sensitivity : Max. 2VAC or 4Vp-p for from 5Hz through 5MHz
2) Secondary digit display shows AC volt measurement value simultaneously together with frequency in main digit display. The specification for this acv is shown in the previous item no.2.

14. Pulse width

RANGE	RESOL.	ACCURACY	INPUT IMPEDANCE	PROTECTION
200.00 ms	10u Sec.	0.1% +5d	10Mohm//1nF	500VAC or DC

Note

Sensitivity : same as that for frequency

15. Duty cycle

RANGE	RESOL.	ACCURACY	PULSE WIDTH	PROTECTION
100.00 %	0.01%	0.1%+5d	0.1ms~200ms	500VAC or DC

16. Temperature

RANGE	RESOL.	RANGE	ACCURACY	PROTECTION
℃	0.1℃	-20~0℃	±3℃	Max. 500VAC or DC for V Terminal, 1A 600V Fast Fuse for mA Terminal
		0~150℃	±2℃	
		150~1200℃	±2 %	
°F	0.1°F	°F= 32+(9/5x℃)		
°K	0.1°K	°K=℃+273.1		

Note

Usable temp. Sensor : K-type probe whose accuracy should be added to the above accuracy only for the meter and the temp. adapter provided as main unit and accessory.

17. Peak +/- detection

FUNCTION	ACCURACY	REMARK
DCmA	Less than 10% for peak with >5ms of duration and with >10% of full scale of each range	
DCV		
DCuA		
DCmA		
DCA		

18. Protection

TERMINAL	FUNCTION	MAXIMUM INPUT	PROTECTION DEVICE
V	DCV, ACV	1000VDC or AC Peak	10M 1/2W Resistor
	Hz,Temp.	500VDC or AC RMS	10pF 1kV Capacitor
	Others	250VDC or AC RMS	PTC(500ohm, 5kohm)
u/mA	0.5A DC or AC RMS		1A 600V Fast Fuse
10A	10A DC or AC RMS		15A 600V Fast Fuse